NOTE: You are responsible for all terms in this lecture, several of which are not on your word list.
Also add: stethoscope

I. Body Cavities → Handout

A. Dorsal
   1. cranial
   2. vertebral

B. Ventral
   1. thoracic
      - pericardial → around heart
      - pleural (2) → around each lung
      - mediastinum → not a cavity, but a partition between pleural cavities which includes the heart, pericardial cavity, & other structures
   2. abdominopelvic – separated from thoracic by diaphragm
      -- abdominal
      -- pelvic
      -- peritoneal → surrounds organs

   “3 P’s”: pericardial, pleural, peritoneal all contain lubricating fluid, not organs

II. Overview of cardiovascular system -- Fig. 5.1 (lower right)
   [red = oxygenated, blue = deoxygenated]

   A. Pump & plumbing to distribute O₂, nutrients & wastes
   B. Systemic circulation (left heart) delivers oxygenated blood from lungs → body systems
   C. Pulmonary circulation (right heart) delivers deoxygenated blood from body → lungs “lungs”

III. Heart – Fig. 5.1 & Handout

   A. In mediastinum, deep to sternum
      1. apex points left
      2. CPR (cardiopulmonary resuscitation) relies on compressing sternum

   B. Heart wall composed of 3 layers
      (Superficial → deep)
      1. epicardium
      2. myocardium = cardiac muscle
      3. endocardium

   C. Pericardium surrounds entire heart → insert sketch
      visceral pericardium = epicardium
      pericardial sac
      fibrous pericardium surrounds all and anchors heart in mediastinum
D. Heart Chambers (4) – Fig 5.1
1. Atria (singular=atrium)
   --receive blood; thin walled
   --separated by interatrial septum (fence)
2. Ventricles
   --pump blood; thick-walled
   --separated by interventricular septum

E. Heart valves
1. Atrioventricular (AV) valves
   --prevent backflow of blood into atria when ventricles contract
   Right AV valve = tricuspid valve (3 flaps)
   Left AV valve = bicuspid valve (now obsolete) or mitral (bishop’s hat)
2. Semilunar valves (2)
   --at base of aorta & pulmonary trunk
   --prevent backflow of blood into heart when ventricles relax

IV. Blood flow through heart → Be able to sequence!
A. Follow arrows in Fig. 5.1 & handout

   Superior vena cava↓
   R. Atrium
   Inferior vena cava↓  ↓
   R. A-V valve (tricuspid)
   ↓  ↓
   R. ventricle
   ↓
   Pulmonary semilunar valve
   ↓
   Pulmonary Trunk [fix Fig. 5.1 & 5.2]
   ↓
   L & R pulmonary arteries
   ↓
   Lungs
   ↓
   L & R pulmonary veins
   ↓
   L. atrium
   ↓
   L. A-V valve (bicuspid or mitral)
   ↓
   L. ventricle
   ↓
   Aortic semilunar valve
   ↓
   Aorta
B. When ventricles contract = systole
   When ventricles relax = diastole

   120/80 mm Hg = systolic/diastolic pressure

   -measured with a sphygmomanometer
     “pulse” \( \rightarrow \) “pressure”
   --the rise from 80 \( \rightarrow \) 120 is what you feel as the pulse.

   stroke volume (SV) vs. ejection fraction vs. cardiac output (CO)
   per beat \( \rightarrow \) \~60\% \( \rightarrow \) per minute

C. Heartbeat is self-generated (Fig. 5.7)
   • Normal sequence is atria \( \rightarrow \) ventricles \( \rightarrow \) pause \( \rightarrow \) repeat
      = normal sinus rhythm (NSR)

     SA (sinoatrial) node = normal pacemaker, near entry of superior vena cava
     \[\downarrow\]
     AV (atrioventricular) node
     \[\downarrow\]
     AV bundle (bundle of His) \( \rightarrow \) in interventricular septum
     \[\downarrow\]
     L & R bundle branches
     \[\downarrow\]
     Purkinje fibers

     \( \rightarrow \) This electrical activity causes and is immediately followed by physical
     contraction: text is very misleading and equates the two

     polarized \( \neq \) resting; = “charged” [physically relaxed]
     depolarized = discharged, which then causes contraction
     repolarized = recharged, which is followed by relaxation

D. Electrical activity is transmitted to skin where it can be recorded as an
   electrocardiogram (ECG or EKG)

E. Abnormalities result in arrhythmias (Fig. 5.11)
   Most severe is sudden cardiac arrest (SCA) due to ventricular fibrillation

V. Blood vessels & scheme of systemic circulation
   A. KNOW Fig 5.3
Note:
Pulmonary trunk & arteries → deoxygenated
Pulmonary veins → oxygenated

B. Blood vessel histology (Fig. 5.4 & 5.5)
- lumen is a general term referring to the space in any hollow organ
- arteries have thicker walls to resist pressure, no valves
- veins have thinner walls, valves to assist return of blood to heart (Fig. 5.14) → failure leads to varicose veins

VI. Clinical
Cardiovascular disease is #1 killer in America = 40% all deaths
Heart disease -- #1
Stroke -- #3
- also leading cause of disability
- Oklahoma is particularly bad → www.cdc.gov

A. Diseases may be acquired or congenital
Congenital anomaly = "birth defect"
Ex. atrial septal defect (ASD) or ventricular septal defect (VSD)

B. Reduction in blood flow – Fig. 5.9
1. Causes
   → anything that leads to stenosis: narrowing of the lumen
- constriction ➔ from outside
- obstruction ➔ partial blockage from inside
- occlusion ➔ total blockage from inside
- atheromatous plaque
- thrombus = clot
- embolus = clot that has moved

2. Results
- perfusion deficit (↓ flow through a vessel) leads to ischemia (↓ blood flow to tissue)
- if severe, leads to infarct (tissue necrosis) ➔ MI (myocardial infarct)
- acute coronary syndrome (ACS) are signs & symptoms associated with reduction of blood flow = coronary artery disease (CAD)

C. aneurysm (Fig. 5.8) – pathological widening of an artery
- Note 3 types

D. Diagnostic tests & procedures:
1. EKG vs. EPS (intracardiac ElectroPhysiologic Study)
   - uses internal electrodes
   - can also be used for intracardiac catheter ablation

2. radiology: injection of contrast medium to allow visualization of vessels
   - 5 terms:
   - angiography & angiogram ➔ any vessel
   - coronary angiogram
   - arteriogram & aortogram
   - venogram

3. nuclear medicine imaging: better at visualizing functions of heart
   - myocardial radionuclide perfusion scan (stressed or unstressed) ➔ CAD vs.
   - multiple-gated acquisition (MUGA) scan ➔ pumping function vs.
   - positron-emission tomography (PET) ➔ cellular metabolism

4. cardiac catheterization (Fig. 5-18 & 5-22) is necessary for many procedures
   - O₂ levels, pressure readings, contrast media, instrumentation
   - PCI (percutaneous coronary intervention)
     - Angioscopy
     - Atherectomy
     - PTCA (percutaneous transluminal coronary angioplasty)- usually balloon and stent: Fig. 5-22

5. sonography (Fig. 5-1)
   - Echocardiogram (ECHO)
   - TEE (transesophageal echo) – usually involves Doppler sonography
     - can get moving images
See www.heartsite.com for videos

CV (Ch. 5) -- Page 5 of 6
E. Drugs

1. ACE inhibitors
   - Angiotensin converting enzyme (ACE) converts angiotensin I → angiotensin II
   - Angiotensin II is a powerful vasoconstrictor (as name implies) → ↑ blood pressure
   - Inhibiting angiotensin II thus will ↓ blood pressure.

Renin-angiotensin-aldosterone system

2. beta-adrenergic blocking agents (beta-blockers or β-blockers)
   - inhibit sympathetic nervous system, hence lowering heart rate & blood pressure
   - both are antihypertensive drugs

F. Note: don't confuse the "a" words:
   Atri → atrium
   Arter → artery
   Ather → plaque
   Ex: Does arteriostenosis cause atherosclerosis or does atherosclerosis cause arteriostenosis?

--Lots of abbreviations!